

DESCRIPTIONS OF SIX NEW SPECIES OF AUSTRALIAN
POLYPLACOPHORA (FOUR ACANTHOCHITONS AND TWO
CALLISTOCHITONS), WITH OTHER NOTES.

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[Read October 9, 1919.]

PLATES XLI. AND XLII.

ACANTHOCHITON PILSBRYI, Sykes.

Pl. xli., figs. 1 to 3.

A. pilsbryi, Sykes: Proc. Mal. Soc., vol. ii., pt. 2, July, 1896.

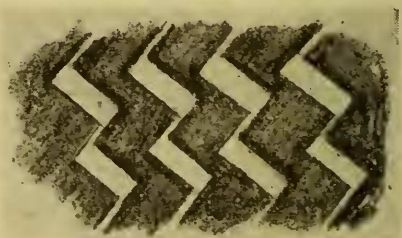
A. maughani, Torr and Ashby: Trans. Roy. Soc. S. Austr., vol. xxii., 1898.

I am indebted to Mr. James A. Kershaw, of the National Museum, Melbourne, for the opportunity of examining Sykes' type of the above shell. Sykes states that he had only the single specimen and did not disarticulate the anterior valve. An examination of the type at once gives the reason, for that valve, in common with several of the others, is badly broken. Further, the marked character of the sculpture of this shell is much obscured in the type owing to erosion and fracturing, but still more to the extensive limy encrustations, the deep interspaces between the pustules being in most cases entirely filled in with the accretions.

The very faulty drawings and description in Sykes' paper are undoubtedly due to this feature. Both Mr. Sykes and Dr. Pilsbry, to whom he submitted the type, emphasize the character of the dorsal area, narrow and well defined, but both ignore the characteristic feature of the shape and arrangement of the general sculpture so striking in good specimens of this shell.

Description of sculpture referred to:—In the pleural area the pustules are about twice as long as broad, are

square-ended and set in rows on the diagonal, so that one corner only reaches the upper line, the interspaces between the rows being a series of almost square hollows, the direction of the row of pustules is parallel with the dorsal area. A limited amount of bridging connects the pustules of one row with those of the next row. In the lateral area the row



A. pilsbryi, method of sculpture in pleural area.

becomes curved and the pustules larger, more raised, and rounded.

Hab.—Victoria and South Australia.

ACANTHOCHITON PILSBRYI MAUGHANEANUS, n. sp.

Pl. xli., fig. 4.

Differs from *A. pilsbryi*, Sykes, in having pustules less raised and rounded. The pustules are even more rectangular than is the case in the dominant form; in the anterior valve they are about twice as long as wide, straight-sided and square-ended, narrower as well as being less raised. While probably the number of pustules is about the same, owing to their being more slender the interspaces are proportionally wider. In the median valves the pleural area is markedly different from *A. pilsbryi* in that the pustules are very slightly raised, are long and slender, with greater space between the rows. Also the bridging in the species under description is more complete, a raised ridge joining the posterior portion of one pustule to the anterior portion of the corresponding one in the row above, thereby increasing the honeycomb appearance so characteristic of the southern and dominant species. The pustules in the lateral area are more raised and larger than in the pleural, but this feature is less pronounced than in *A. pilsbryi*.

Hab.—Sydney Harbour, New South Wales.

Remarks.—Owing to the recognition of Dr. Torr's and my *A. maughani* as Sykes' shell, that name becomes a synonym of *A. pilsbryi*. I am therefore preserving the name of Mr. M. M. Maughan, the ex-Director of Education in this State, by naming the subspecies after him.

The type I am presenting to the South Australian Museum; it was collected by myself at Middle Harbour, Sydney, New South Wales.

Genus ACANTHOCHITON, Gray, 1821.

: Subgen. NOTOPLAX PORCINA, n. sp.

Pl. xli., figs. 7 to 10.

General appearance.—Shell elongated, glossy, carinated, side slope straight, all valves more or less covered with fine longitudinal ribbing.

Colour and markings.—Light vinaceous-cinnamon, mottled with congo pink in the dorsal areas (Ridgway's Colour Standards, pl. xxviii. and xxix.).

Anterior valve.—Has five shallow undulations or ray ribs, is fairly evenly covered with wavy, concentric ribbing; in character these resemble "ripple marks" on the sea sand. These marks turn inwards towards the apex of valve along the central rib. Near the apex the "ripple marks" are crowded

and broken into incipient, flattened pustules. Insertion plates, porcelain white, slits five, broad.

Posterior valve.—Mucro very distinct, posterior, the anterior portion of valve is similar in sculpture to the pleural and lateral areas in other valves. A diagonal depression separates this from the posterior portion, the ribbing being deflected downwards and its character somewhat altered, the ribs here showing a tendency to become granulose, still further changing when the posterior part of valve is reached, the shell there being covered with closely-packed granules without any system of arrangement. Insertion plates white, one broad slit on each side and four, and suggestion of a fifth, immediately behind the mucro.

Median valves.—The dorsal area is longitudinally lined with whitish lines separated from one another by darker lines which look like grooves, but under a stereoscopic microscope the surface is found to be practically ungrooved longitudinally, but crossed by shallow transverse sulci. Strictly speaking there is some evidence of shallow longitudinal grooving existing in places; this feature may be more marked in other specimens.

The pleural area is covered with close, wavy, longitudinal ribbing, the ribs are more abrupt on the lower side, and the trough between them is broad and shallow; both ribs and trough are diagonally scratched or minutely grooved. The lateral area is sculptured in a similar manner to the pleural, but the ridges are deflected upwards on reaching the diagonal undulation, it can barely be called a rib, which separates the two areas; the lateral area is very small compared with the pleural. Inside of shell white, median valve one slit, sutural laminae produced very little forward, sinus broad and sinuate.

Measurements.—35 mm × 11 mm. in dried specimen.

I am indebted to Dr. W. G. Torr for the opportunity of describing this very fine *Acanthochiton*; it was dredged in Gulf St. Vincent, South Australia. Up to the present only one specimen has been met with. The type will remain for the present in Dr. Torr's collection, but ultimately it will be placed in the South Australian Museum.

Remarks.—This species can easily be distinguished from *Notoplax matthewsi*, Bed. and Pils., by the ribbing being continuous and not broken into granules, the ridges are less strong, and the pinnatifid character of the dorsal area, so marked in *N. matthewsi*, is almost absent in this species. It is more nearly allied to that species than to any other *Acanthochiton* known to me. The specific name is derived from the Latin *porca*, meaning a ridge between furrows.

ACANTHOCHITON MAXILLARIS, n. sp.

Pl. xli., figs. 5 and 6; pl. xlii., fig. 1.

General appearance.—Shell long, rather flat, sides slightly rounded, dorsal area much rounded, width of shell less than half its total length, dorsal area broadly wedge-shaped, all the valves are covered with longitudinal rows of rather large, rounded, mostly porcelain-white pustules, the outer row or rows being irregular in arrangement, all pustules in these being much larger than those in the upper rows and some being twice as long as their neighbours and mammiliform; here and there there is a tendency for these large pustules to coalesce.

Colour.—Shrimp-pink varying in places to geranium-pink (Ridgway's Colour Standards, pl. i.), the girdle is Brussels brown, this colour occurring also in places in the ground-colour of the shell mottled in with the pink. The milk-white or porcelain-white pustules contrast strikingly with the general ground-colour of the shell.

Anterior valve.—This valve is too broken to disarticulate, is clothed with white pustules smaller towards the apex, and larger and more rounded towards the girdle; there are evidences of ray ribs, probably five, this feature being so common to Acanthochitons.

Posterior valve.—Mucro posterior, dorsal area similar to median valves, broadly wedge-shaped and flat and transversely finely ridged. Balance of valve covered with closely-packed granules, greyish or transparent white, but the granules of the outer row forming the edge of the tegmentum are twice as large as the rest, broad and round, packed closely together, and porcelain-white in appearance. This outer row of pustules gives a scalloped look to the margin of the tegmentum. Inside white, tinged in places with pink, slits two, the sutural laminae form almost three sides of a square with rounded corners.

Median valve.—Dorsal area very broad, subcutaneously lined with olive lines, transverse and longitudinal striae, the latter very indistinct. Apex is formed into a broad, rounded, flat beak, which overhangs and is distinctly rugose. The pleural and lateral areas are hardly separable, and there is a considerable margin of variance between the different valves but all show three or four longitudinal rows of rounded or oval, distinctly separated, milk-white pustules, those next the dorsal area are rather smaller than the lower row, then follows a row of milk-white pustules, fully three times the size of the upper row, and more or less placed alternately, short and long, looking like a row of irregular, rounded teeth set in a jaw, between this row, which rather follows the lines of growth

than being strictly longitudinal, and the outer margin, are a few irregularly-placed elliptical or rounded pustules, some milk-white, others dark. Inside white, slits one, ill defined, and placed far back on the insertion plate, suture broad.

Hab.—Marino, South Australia. Collected by myself; only one specimen on rocks at low tide.

Girdle.—Spongy, but in places scattered minute spicules can be detected, towards the outer margin there are evidences of minute scales; it is possible that the scales have broken away from the older parts of the girdle. A fairly conspicuous hair-tuft is placed at each suture, but the spicules are short.

Measurement.—7 mm. $\times$ 3 mm.

Remarks.—This beautiful and striking *Acanthochiton* is easily distinguished from any known species by the row of exceptionally large milk-white pustules suggesting a row of rounded teeth set in a jaw, present in the median valve. The name is derived from the Latin *maxilla*, a jaw. The type I am for the present keeping in my own collection, but ultimately I hope to place it in the South Australian Museum.

ACANTHOCHITON GATLIFFI, n. sp.

Pl. xlii., figs. 2 to 5.

General appearance.—Shell twice as long as broad (dried specimen), side slope very slightly curved, dorsal area broadly wedge-shaped, much raised, rounded transversely and longitudinally, valves covered with curved longitudinal rows of rather large, raised, flat pustules.

Colour.—The dorsal areas are deep Hellebore red, and the girdle and most of the ground-colour of the rest of the shell Dresden brown, the red merging into the brown; the pustules are a lighter shade than the portion of shell on which they are placed. (Ridgway's Colour Standards, pls. x., xxviii., and xv.)

Anterior valve.—Five rays or undulations, the whole valve uniformly clothed with whitish, elliptical, raised pustules, well separated from one another but not placed in defined rows; these pustules are smaller and less flat than are those on the median valves. Inside and insertion plates deep pink, five slits, teeth sharp.

Posterior valve.—Very small, mucro slightly posterior, dorsal area wedge-shaped but smaller in proportion than the other valves. The portion of shell to the front of the mucro is ornamented with a few large flat pustules in two rows, the posterior portion of valve decorated towards its margin with two rows of small granules. Inside pink, slits three, the insertion plates are produced posteriorly for a width almost equal to half of the exposed portion of valve, sutural laminae are produced sideways to an unusual degree almost forming a point, sinus broad.

Median valves.—The dorsal area broadly wedge-shaped, highly arched, longitudinally convex, beaked, pinnatifid. The markings and sculpture are a little difficult of definition, there is present a series of whitish spots arranged longitudinally on a dark-pink ground, the wavy longitudinal and transverse striae together with the colour markings give a granulose appearance to the whole of this area, which may be described as looking like strings of very small granules separated by dark-pink lines. The pleural and lateral areas are inseparable, are traversed by widely spaced, rather coarse, raised but flat pustules, under microscope they look like whitish, flat topped flagstones laid on the crown of raised portions of the tegmentum. Inside pink, insertion plates pink, slit one.

Girdle.—Spongy, a few scattered short spicules and an incipient fringe. Hair tufts well defined, spicules short.

Measurement.—The type (dry) measures 5 mm. $\times$ $2\frac{1}{2}$ mm., being a little curved, probably 6 mm. would be nearer correct. Mr. Gatliff's shell 6 mm. $\times$ 3 mm. and Mr. Gabriel's shell 8 mm. $\times$ 4 mm.

The type remains for the present in my collection but I shall hope ultimately to place it in the South Australian Museum.

Hab.—I collected the type myself at Port Lincoln, South Australia, and sent two others, collected at the same place and time, to Mr. Iredale as being the same; but until these are returned to me and I can examine them under a microscope I cannot absolutely determine their identity. Messrs. Gatliff and Gabriel have both loaned me single specimens obtained off Point Cook, Port Phillip, Victoria, in 8 fathoms.

Remarks.—I am indebted to the two gentlemen above named for the opportunity of examining their specimens; they exhibit a few minor differences. Neither show the pink colouration which is such a marked feature in the type; it is possible that their specimens may at one time have been in spirit which would remove the colour. Mr. Gabriel's shell, which is the largest of the trio, has a distinctly rugose dorsal area, becoming granulose toward the beak; the pinnatifid character of this area is more distinct, and there are evidences of very minute scales on the girdle and of a girdle fringe.

This interesting little *Acanthochiton* has been in their collection for some years, but was wrongly identified by them as Sykes' shell *A. pilsbryi*, a species dealt with in the earlier portion of this paper.

I am naming this shell after Mr. Gatliff, who with his colleagues has done much good work on the Victorian fauna.

CALLISTOCHITON ANTIQUUS MERIDIONALIS, n. sp.

Pl. xlii., fig. 7.

Introduction.—In setting out to describe a new form of *Callistochiton* I collected on the North-west coast of Tasmania I have been compelled to examine specimens from the type locality, New South Wales, which was described under the name *C. antiquus* (pl. xlii., fig. 6) by Reeve in 1847, and compare them with the Tasmanian shells and South Australian shells, with the result that I find that our South Australian shell must receive a distinguishing name before the new Tasmanian shell can be put in its right niche in our classification.

Description of differences.—In the South Australian shell the longitudinal ribbing in the pleural area is broader, less elevated, more wavy and granulose than in the shell from New South Wales, also instead of running parallel to the midline they are deflected somewhat towards it. The bridging of the South Australian shell is only slightly lower than the ribs, whereas in the northern shell the bridging is deep, not standing up nearly as high as the longitudinal ribs; also the transverse ridges on the two lateral ribs are less elevated, further apart, and more numerous in the South Australian form. A still more striking difference is revealed when the valves are disarticulated. The anterior margin of the tegmentum is almost straight in the Sydney shell, but in the South Australian one it is produced forward almost to a point. The sutural laminae are broad and straight-edged in the northern shell, but are narrow and more produced forward in the South Australian shell. Another marked feature is that while in both the articulamentum is continued in front of the tegmentum across the sinus, in the South Australian shell it is divided into minute teeth—I counted 10 slits—the edge of each of the minute teeth is curved, giving a scalloped margin to this portion of the articulamentum, whereas in the Sydney shell it is straight-edged, the slits being suggested by slight grooves. I am suggesting the subspecific name of *meridionalis* for the South Australian shell. I have found this shell wherever I have collected in this State.

Type is from Marino. I am presenting it to the South Australian Museum.

CALLISTOCHITON ANTIQUUS MAWLEI, Iredale and May.

This species was described from Port Arthur, South-eastern Tasmania by Messrs. Iredale and May. It differs again from either of the foregoing in that the longitudinal ribbing is persistent right over the dorsal area, the irregular network present in the two former being absent. The longitudinal

ribbing corresponds with the South Australian shell in the width of the ribs, but they are almost straight, nearer together, the bridging greatly thickened and proportionately shorter.

The transverse ridges in the two lateral ribs are present as mere nodules, irregularly spaced and not as sharp strongly elevated ridges as in the two preceeding. This form easily takes its place as a subspecies of Reeves' *Callistochiton antiquus*.

CALLISTOCHITON ANTIQUUS MAYI, n. sp.

Pl. xlii., figs. 8 and 9.

The only opportunity I have had of collecting Chitons in North-western Tasmania was limited to one afternoon on October 11, 1916, when I had an hour or so on the rocks at a place called Penguin. Amongst the shells then collected was a small *Callistochiton* quite new to me, which I concluded and put aside as being Iredale and May's new *Callistochiton C. mawlei*, which I had not then seen. Since then my friend Mr. May has given me a specimen of that shell, and I find that the Penguin shell is quite distinct. I sent it over to Mr. May for his opinion, and he concurs with my view. I propose naming it after Mr. May as an acknowledgement of the help he has been in the elucidation of Tasmanian Chiton fauna.

Description of differences.—This species differs from any of the preceeding in the entire absence of longitudinal ribbing. The whole pleural area is reduced to a network of which the strands are so thick that the holes between are nearly filled in, in the dorsal area this is absolutely the case, nothing but fine granulose sculpture remaining.

Under a pocket lens the pleural and dorsal areas appear simply granulose, the network origin of the sculpture is quite lost. Under a higher power, however, the network sculpture survives in the form of numerous pits scattered towards the anterior margin.

The transverse ridges in the lateral ribs are almost as defined as in the South Australian shell, but these ridges are more numerous and closer together. Measurement, 8 mm. × 5 mm. I consider this species diverges most from the dominant form of all the subspecies here dealt with.

Remarks.—In the absence of the examination of the Victorian *Callistochiton* fauna, our knowledge of the effect or otherwise of the Bassian Isthmus (Hedley: Proc. Linn. Soc. N.S. Wales, xxvii., 1904) on the distribution of this genus is very incomplete. In some respects the South-eastern Tasmanian shell shows affinities with the Sydney shell; but the North-western Tasmanian shell is certainly more closely allied to the South Australian than either of the other two. This is certainly suggestive but inconclusive, until more Victorian material is examined. I hardly think any additional word is

needed to justify the placing of the four very distinct forms herein dealt with under the specific name of *C. antiquus*, Reeve, as subspecies thereof. I take it that true science is better served in showing their affinities, rather than magnifying their differences. We may conclude that all four species have a common ancestry, but that each of the widely separated localities has developed a fixed type of its own.

In conclusion.—In my list of Australian Polyplacophora (Trans. Roy. Soc. S. Austr., vol. xlii., 1918) under the heading *Callistochiton*, two species and one subspecies were given, viz., *C. antiquus*, Reeve, 1847; *C. recons*, Thiele, 1911; and *C. mawlei*, Ire. and May, 1916, the lastnamed being recorded as from both South Australia and Victoria. As regards the first it certainly was incorrect, and as far as I am aware it has not yet been found in Victoria.

Two more must be added to the list now, bringing the total to five, and it is very probable that the very beautiful shell described by Dr. Torr as *Ischnochiton bednalli*, may have ultimately to be referred to this genus; I have not yet seen a disarticulated specimen, so cannot express a definite opinion. Undoubtedly the network sculpture is suggestive of this genus, but in some other respects it does not show any very close affinity with any of our known Australian forms.

Since finally typing the foregoing paper I have turned up Iredale and May's description of *C. mawlei* (Proc. Roy. Soc., vol. xii., pts. ii. and iii., Nov. 1916) and cannot refrain from quoting their concluding remarks on the differences: "in the formation of the sutural laminae, these are continuous, whereas they are widely separated in the species *C. antiquus*, Reeve, and even more so in the South Australian species."

Mr. S. Stillman Berry, of California, writes me on July 1, 1919:—"Your alcoholic specimens of *Callistochiton* (from South Australia) do not look like the dry *antiquus* from Sydney." I think it probable that when the Victorian fauna is fully investigated we shall recognize two distinct species, *C. antiquus*, extending from Queensland down the East Coast, finding its extreme southern limit in Port Arthur, in Tasmania, where the subspecies *C. mawlei*, I. and M., is its representative, and a western species, extending from the submerged Bassian Isthmus through South Australia and Western Tasmania to Western Australia, of which the dominant form will be *C. meridionalis*, herein described, with *C. mayi*, also described herein, as its subspecies.

Addenda.—After completing the draft of the foregoing paper I received from Mr. C. J. Gabriel, of Melbourne, an *Acanthochiton* which he had compared and identified with Sykes' type of *A. pilsbryi* in the Melbourne Museum. Mr.

Gatliff had previously sent me a smaller shell of same species that he had also identified with Sykes' type. I felt that to go counter to two such able conchologists needed assurance made doubly sure, and therefore wrote Mr. Kershaw asking that he would be good enough to loan me Sykes' type again with permission to disarticulate another valve and clean same, because in its then encrusted and stained condition an element of almost intuition enters into its determination. Mr. Kershaw has sent me the type with the permission asked for. I was disappointed at finding that every valve was fractured, but have successfully disarticulated the second valve, which although considerably broken has sufficient sculpture remaining for the purpose. I can, now it is cleaned, authoritatively state that *Acanthochiton maughani*, Torr and Ashby, is cospecific with Sykes' shell *A. pilsbryi*, and is therefore a synonym; also that Messrs. Gatliff and Gabriel's shells from Point Cook, Port Phillip, Victoria, are fine specimens of my Port Lincoln shell that I am naming *A. gatliffi*. I have photographed under a high magnification the cleaned valve of Sykes' type with a corresponding valve of *A. maughani* from the type locality, Port Victor. This photo is reproduced herein, and will, I trust, demonstrate to the satisfaction of all workers my contention.

Photography.—I have contended for a long time that for purposes of accurate determination photography should be much safer than the work of an artist however well executed. While good photographs are comparatively easy at low magnifications, its difficulty is greatly increased under high magnification; this of course is especially the case with the carinated shells of Chitons. Further special methods of lighting have to be made use of to bring out the sculpture. The species under review has been figured three times—Proc. Mal. Soc., vol. ii., pl. ii., July, 1896, drawn by J. Green for Sykes; again in Trans. Roy. Soc. S. Austr., vol. xxii., 1898, figs. 5, *a*, *b*, *c*, *d*, and *f*, pl. vii., under the name of *A. maughani*, drawn by C. Hedley for Torr and myself; and lastly, the New South Wales form in Rec. Austr. Mus., vol. vii., No. 4, 1909, figs. 24, 25, 26, and 27, pl. lxxiv., drawn by Miss W. West for Messrs. Hedley and Hull. While the lastnamed figures are beautifully executed and a great advance on earlier attempts, the true character of the remarkable sculpture of the pleural area is not delineated. No further apology is needed for the presentation of the photos of this shell as attached to this paper. It is a satisfaction to have been able to clear up a long standing difficulty, and my thanks are due to Dr. Torr and Messrs. Kershaw, Gatliff, and Gabriel for the examination of material that has helped towards the solution of the problem.

DESCRIPTION OF PLATES.

PLATE XLI.

AUSTRALIAN POLYPLACOPHORA.

- Fig. 1. *Acanthochiton pilsbryi*, Sykes, $\times 10$, from S. Austr.
 „ 2. „ „ „ $\times 23$, type, median valve.
 „ 3. „ „ „ $\times 23$, from S. Australia,
 median valve.
 „ 4. „ „ *maughaneanus*, Ashby, $\times 28$,
 median valve.
 „ 5. „ *maxillaris*, Ashby, $\times 28$, posterior valve.
 „ 6. „ „ „ „ median valve.
 „ 7. „ *porcina*, Ashby, $\times 1\frac{3}{4}$.
 „ 8. „ „ „ $\times 6$, anterior valve.
 „ 9. „ „ „ „ median valve.
 „ 10. „ „ „ „ „ posterior valve.

PLATE XLII.

AUSTRALIAN POLYPLACOPHORA.

- Fig. 1. *Acanthochiton maxillaris*, Ashby, $\times 10$.
 „ 2. „ „ *gatliffi*, Ashby, $\times 11$.
 „ 3. „ „ „ $\times 28$, anterior valve.
 „ 4. „ „ „ „ posterior valve.
 „ 5. „ „ „ „ median valve.
 „ 6. *Callistochiton antiquus*, Reeve, $\times 15$, median valve, from
 New South Wales.
 „ 7. „ „ *meridionalis*, Ashby, $\times 15$,
 median valve, from S. Austr.
 „ 8. „ „ *mayi*, Ashby, $\times 15$, median
 valve, from Tasmania.
 „ 9. „ „ „ „ Ashby, $\times 15$, anterior
 valve, from Tasmania.